

**SEARCH REPORT**

Your Ref: H0004229

Our Ref: 210077/AAM/al

An International Novelty Search was conducted in respect of a variable geometry turbocharger control system intended to improve the transient dynamic response of the vanes of the variable nozzle of the turbocharger. The control system has the following features:

- A supervisor logic for measuring and comparing the new desired value to the actual value.
- A time varying controller for introducing a pulsed action for rapid valve actuation, increasing system response.
- The control system uses separate control signals for small variations and a larger variations exceeding a specified threshold.

**Results:**

(C=See Comments on Results (number))

Number	Equivalents				C
EP 1024259	DE 19903118	JP 200220485			1
EP 1081353	JP 2001065358				1
EP 1225320					4
EP 599321	US 5440879				1, 2, 4
EP 786589	US 5867986				1
EP 992663	JP 2000110574				1
GB 2304823	DE 19531871	FR 2738287	US 5850737		1
GB 2331596	DE 19751977	FR 2771450	US 6161383	JP 11264320	1, 3
JP 03105022					2
US 4685302	JP 60209632				2
US 5123246					1
WO 0020746	US 6272859				1
WO 0155575	EP 1250523	US 200132465 US 6418719			1
WO 0159275	US 2002029772 US 6427445				1
WO 0166921	DE 10010978	EP 1179128			2

Number	Equivalents				C
WO 0229228	EP 1195506	JP 2002115551			2
WO 0229229		JP 2002115552			
WO 0229230		JP 2002115553			
		JP 2002115572			
WO 9745633	EP 901569				2
WO 9923377	EP 1029166	US 6000221			1
		US 6134890			
		US 6233934			

Abstracts of the above are enclosed.

#### **Comments on Results:**

Our searches have failed to locate any references considered to be of relevance. Nevertheless, we believe that the search was focused in the most likely areas to uncover prior art. There are other areas that the search could be extended to - see the section on "Recommendations for Extension" towards the end of this report.

Comments on the individual references are as follows:

A control system for a variable geometry turbocharger, having the following features:

1. Equalisation of desired and actual boost pressure.
2. Closed loop control system for increasing response to transient inputs, such as quick acceleration.
3. Pulsed control of actuators.
4. As measured operating parameters exceed specified threshold values differing control modules or control signals are employed.

**Field f Search: Manual Searches**

The EPC is applied retrospectively, and it takes on average eight months to be applied to a given patent publication.

The latest dates reflect when the EPC records were consulted, and not the actual dates of the patent publications.

The EPC search has been updated/supplemented by an IPC search.

Classification/Indexing System	Country/ Body	From	T
European Patent Office Classification (EPC)		(Date style DD/MM/YYYY)	
F02D 33/02B6	DE	01.01.1990	11.10.2002
	EPO	01.01.1990	11.10.2002
	FR	01.01.1990	11.10.2002
	GB	01.01.1990	11.10.2002
	US	01.01.1990	11.10.2002
	WIPO(PCT)	01.01.1990	11.10.2002

**Field of Search: Computerised Searches**

Our classification-based 'manual' searches have been supplemented by searches through electronic records, as follows:

Source	Period	Countries/Bodies	Keywords (*indicates any word ending)	Classes IPC/EPC (*indicates any ending)
On-line	1976 to date	DE, EPO, FR, GB, JP, US, WIPO(PCT)	turbo*, nozzl*, geometr*, var*, transien*, dynamic*, respon*, control*, supervis*, logic*, puls*, system*, signal*	Unrestricted

**Notes on Computerised Searches:**

The vast majority of computerised sources (databases) are incomplete. All of the stated records are rarely present, particularly for the most recent publications "covered" by the database. In addition, for databases covering more than one publishing body, the recording of patent family members (equivalents) is not comprehensive. For these reasons it is our practice to conduct database searches as a supplement to classification-based 'manual' searches. Only in cases where there are tight budgetary constraints do we consider conducting an entire search 'electronically'.

The periods covered are approximate. The date range corresponds to the earliest and latest publications, not necessarily from the same publishing body in the case of databases covering the publications of multiple patent offices.

Selected records from the field of search defined above will have been examined. These records will have been identified by employing strategies using keywords and/or classes. A successful strategy for one database is not necessarily appropriate to another database.

Some databases offer additional facilities such as backward/forward citation searching or patent family searches. Where appropriate these facilities will have been used.

**Recommendations for Extension:**

In addition to the headings covered by the search, we have identified others that are promising. In our opinion, there is a reasonable possibility of pertinent material being indexed there. The additional headings are as follows:

EPC: F01D17/00  
F02B37/12, 22, 24  
F02D 33/02, 02B

The definitions of the above classifications are enclosed.

**Notes:**

Equivalents, where listed, have been obtained from readily available sources. Systematic equivalent searches have not been conducted.

It will, of course, be appreciated that there is always the possibility of pertinent patents not having been cross-referenced into the appropriate sub-classes and our search is thus dependent upon the accuracy and the completeness of the classification.

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